

Closure of tracheo-oesophageal fistula following removal of voice prosthesis; a new surgical technique

Chiusura della fistola tracheoesofagea dopo rimozione di protesi fonatoria

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Key words

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Parole chiave

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Summary

The voice prosthesis is today the most widely used and accepted method of voice restoration following total laryngectomy. Fortunately, the cases in which it is necessary to temporarily or definitively close the fistula are rare (request of the patient, leakage from the fistula, aspiration pneumonia). Herein, an analysis is made of these cases and the surgical technique personally developed for the closure of tracheo-oesophageal fistula is described. This technique has been used in 8 patients with good results; moreover, it is a relatively low cost procedure and gives rise to few post-operative complications.

Riassunto

La protesi fonatoria è oggi il metodo più utilizzato ed accettato per la riabilitazione fonatoria dopo laringectomia totale. Fortunatamente i casi in cui viene richiesta la chiusura temporanea o definitiva della fistola tracheoesofagea sono rari. In questo articolo noi analizziamo questi casi e descriviamo la tecnica chirurgica da noi utilizzata per la chiusura della fistola tracheoesofagea. La nostra tecnica è stata utilizzata su 8 pazienti e ha dato buoni risultati; in più è una tecnica che richiede bassi costi e causa poche complicazioni post operatorie.

Introduction

The voice prosthesis is, today, the most widely used and accepted method of voice restoration following total laryngectomy. Despite the fact that satisfactory functional results are often obtained, situations in which it is necessary to remove the prosthesis and to definitively close the tracheo-oesophageal fistula may occur.

There are cases in which the patient chooses to refuse the prosthesis either because he/she has developed a satisfactory oesophageal voice or because he/she finds management of the prosthesis too difficult.

More frequently, removal of the prosthesis becomes necessary either due to loss of saliva and liquids from the enlarged fistula or on account of uncontrollable development of granulations.

In a very few cases, continued leakage of liquids can lead to episodes of aspiration pneumonia which require closure of the fistula in order to remove the cause of the disease. Several different techniques have been developed to correct these defects, but in the, fortunately rare, cases when all efforts fail, it becomes necessary to, temporarily or permanently, close the fistula.

It is evident from the experience of others that efforts aimed at direct closure, by means of stitches directly

on the fistular tracheal orifice, often results in an enlargement.

Several techniques to effect closure have been proposed in the literature, most of which use rotational, myocutaneous or free flaps¹⁻⁴.

Herein, a simple, but efficient, technique for permanent or temporary closure of the tracheo-oesophageal fistula is described.

Technique

Surgery should be performed in narcosis, even if local anaesthesia can be used in selected patients and in those presenting a high risk related to general anaesthesia. Narcosis allows introduction of a "guide tube" into the oesophagus in order that the walls are stretched.

Furthermore, the fistula can be stretched and made visible by a needle or a plastic tube.

As far as concerns the actual surgical procedure: an omega shaped incision (Fig. 1) is made on the roof of the tracheostomy and the posterior tracheal wall is separated from the anterior oesophageal wall. Proceeding laterally, the tracheal rings are made visible as far as 1.5-2 cm below the previously stretched fistula. Very often, especially when the fistula is short,



Fig. 1. Shaped (omega) incision on the roof of the tracheostomy.

the gap between the trachea and oesophagus is a virtual space: in this case, the “guide tube” is fundamental as it stretches the walls of the oesophagus making identification possible. Once the oesophagus has been separated from the trachea, the fistula, which has previously been identified, is dissected and the oesophageal mucosa is closed with inverted sutures (Vycril 3.0). The trachea is then sutured and brought back close to the oesophagus. It is mandatory to avoid contact of the two suture-lines with the absorbable sutures providing lateral traction. In those cases not requiring another fistula, it is possible to use a Vycril mesh that favours granulation and makes a plate of scar tissue within a few weeks.

After suturing, the “guide tube” is removed and the enteral feeding tube is introduced in order to be able to provide nourishment for 4-5 days until feeding *per os* is restored.

To check correct closure of the fistula, X-ray of the hypopharynx and oesophagus is usually carried out employing a hydrosoluble contrast medium (gastrografin); thereafter, patients can start eating semi-solids, solids and liquids. This technique has been used in 8 of our 170 patients, with very good results in all cases.

Discussion

It is known that one of the most frequent complications related to the use of voice prostheses is leakage of saliva, liquids and food from the fistula. According to the literature, this type of inconvenience occurs in about 10% of treated patients and even though it is a problem which can often be solved with minor adjustments, removal of the prosthesis is required in

a small percentage of cases, as well as closure of the fistula that follows spontaneously in most cases.

This type of complication is not the only cause requiring removal of the prosthesis and subsequent closure of the fistula. There are, in fact, other possible events such as: migration of the prosthesis, massive granulation, refusal of the prosthesis on the part of the patient, as well as occasional cases of macrofistula. This latter event occurred in two patients who had been fitted with a Bonelli prosthesis. It is well known that this prosthesis works with the use of a small chain (Fig. 2) that, moving on the inside of the fistula, modifies its shape from round to oval and frequently causes an increase in diameter to >2 cm (Fig. 3).

One should be aware of the fact that fistula instability is frequently seen in patients who underwent post-operative radiotherapy and more frequently in those who have received irradiation of the neck while wearing a prosthesis (primary implant).

Several closure techniques have been proposed in the literature, most of them making use of rotational flaps, whether muscular⁵, cutaneous¹ or myocutaneous of the large pectoral or free.



Fig. 2. Bonelli prosthesis.



Fig. 3. Macrofistula.

Table I. Patient features.

Patient	RT	Cause	Closure	Vycril	New fistula
1	No	Macrofistula	Yes	No	Yes
2	Yes	Refusal	Yes	Yes	No
3	No	Refusal	Yes	Yes	No
4	Yes	Migration	Yes	No	Yes
5	Yes	Migration	Yes	No	No
6	Yes	Granulation	Yes	No	Yes
7	Yes	Macrofistula	Yes	No	Yes
8	No	Refusal	Yes	Yes	No

RT: radiotherapy; Cause: closure cause; Closure: success; Vycril: interposition of reabsorbable Vycril mesh; New fistula: new tracheo-oesophageal fistula with successive new prosthesis.

Hosal and Myers ⁶ proposed a technique similar to the one described here, reaching the same conclusions.

The use of tissue of a certain thickness such as that of a myocutaneous flap or the sternocleidomastoid muscle may negatively affect the tracheal or oesophageal lumen, causing dysphagia and dyspnoea ¹. Moreover, in a patient who has undergone radiotherapy, the sternocleidomastoid muscle is included in the irradiated district that may be compromised in its trophism.

In the present study population, no important differences were observed between patients who underwent radiotherapy and those that did not, as far as concerns success and recovery time. Radiotherapy

pre- or post-surgery did not change our choice of surgical technique.

Furthermore, the greater thickness placed between the trachea and the oesophagus may compromise the preparation of a new fistula as occurs with the use of Vycril net. For this reason, we use this technique only when we are sure that a new fistula will not be necessary. In those patients in whom new fistulas were placed, they remained stable over time.

In the light of these results, this technique may represent, in our opinion, a valid tool to solve a frequent and complex problem distressing patients, since this surgical procedure is relatively low cost and causes few post-operative complications.

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